

Faculty of Science

**AMBULATORY BLOOD PRESSURE MONITORING IN THE TRU SLEEP CLINIC:
SHOULD HIGH BLOOD PRESSURE AND SLEEP APNEA BE TESTED FOR AND
TREATED SIMULTANEOUSLY?**

2014 | KAYLA ANN HOLTSLAG

B.Sc. Honours thesis



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SHOULD HIGH BLOOD PRESSURE AND SLEEP APNEA BE TESTED FOR AND
TREATED SIMULTANEOUSLY?**

by

KAYLA ANN HOLTSLAG

A THESIS SUBMITTED IN PARTIAL FULFILLMENT
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THOMPSON RIVERS  UNIVERSITY

We accept this thesis as conforming to the required standards:

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Dated this 22nd day of April, 2014, in Kamloops, British Columbia, Canada

ABSTRACT

Extensive research has demonstrated a strong correlation between obstructive sleep apnea (OSA) and high blood pressure (hypertension). Furthermore, studies have shown that treating OSA can lead to an improvement in blood pressure levels. Despite this knowledge, many sleep clinics still do not test their patients for hypertension and have yet to develop comprehensive treatment plans that aim to target both OSA and hypertension. The TRU Sleep Clinic currently sees patients referred by local physicians for overnight ambulatory blood pressure (ABP) monitoring; upon their first visit, the patients are questioned regarding their sleep habits and complete questionnaires designed to reveal the level of risk for OSA. Despite this effort, patients are not returning to the clinic for further screening and treatment for OSA. The purpose of this study was to identify ABP patients whose files had been archived, but who should have been tested for OSA, invite those patients back to the clinic for further testing, and determine how to ensure that people do return to the clinic in the future if they are identified as at risk for OSA. To do so, I reviewed 182 archived ABP patient files to identify those patients who demonstrated a risk of OSA during the initial screening process. Then, I contacted those patients and invited them back to the clinic for overnight pulse-oximetry, partly to determine how willing patients were to return to the clinic for OSA testing. I designed a script for contacting patients that emphasized the connection between hypertension and OSA and the possible benefits of treating

OSA for their overall health. Finally, I developed an improved ABP patient archive form in order to ensure that when a patient demonstrates a risk of OSA, their file would not be prematurely archived. Based on their Epworth Sleepiness Scale and STOP-BANG questionnaire scores, and their self-reported sleep issues, 48 of the 182 patients should have been invited back to the clinic for overnight pulse-oximetry to test for OSA. Of those, 20 were contacted successfully and 10 agreed to return to the clinic for pulse-ox. The conclusions from this study were that more than a quarter of the patients who initially visited the clinic for overnight ABP monitoring should have returned for pulse oximetry, a substantial proportion of patients were willing to return to the clinic for further testing, and that a new “Request to Archive ABP Patient File” form was necessary in the clinic to ensure that ABP patients demonstrating a risk for OSA were being identified and not archived.

Thesis Supervisor: Senior Lecturer Dr. Nancy Flood

ACKNOWLEDGEMENTS

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INTRODUCTION

Obstructive sleep apnea (OSA) is a common health concern that often goes undiagnosed; in 2010, it was reported that approximately 3% of Canadians over 18 and 5% of Canadians over 45 have been diagnosed with OSA, and 26% of Canadian adults were at risk for OSA based on specific risk factors (Public Health Agency of Canada 2009). For example, there is an increased risk in certain populations, including males and post-menopausal women, overweight/obese people, the elderly, certain ethnic minorities, and those who have a history of OSA in their family (Academy of Sleep Medicine, 2008). Increased risk is most commonly associated with enlarged oropharyngeal structures, structures which comprise the middle portion of the throat between the soft palate and epiglottis. Genetic factors and obesity are both known to contribute to enlargement of these structures, factors which explain why the aforementioned populations have higher representation (Schellenberg et al., 2000).

Many studies have attempted to find a direct causal link between OSA and various comorbidities due to the high prevalence of conditions such as high blood pressure (hypertension) in patients who also have OSA. The proportion of patients with both OSA and hypertension can be high (Cohen and Townsend, 2013; Friedman and Logan, 2009; Kapur and Weaver, 2012; Marin et al., 2012). For example, one study found that the prevalence of OSA in adults with drug-resistant hypertension was 83% (Logan et al., 2001). OSA was diagnosed in these cases when patients had an apnea-hypopnea index

(AHI) of greater than 10. The AHI is a metric for scoring OSA severity based on the number of absent or decreased respirations per hour; an AHI of 5-15 is classified as mild OSA, an AHI of 15-30 is moderate, and an AHI of >30 is severe (Public Health Agency of Canada, 2009).

There are many confounding variables that can contribute to both OSA and hypertension (or other comorbidities), making causal relationships difficult to confirm. Studies have shown that treatment for OSA using continuous positive airway pressure (CPAP) can lead to lower blood pressure in hypertensive patients (Haentjens et al., 2007). CPAP is the typical treatment for OSA that consists of a mask worn over the nose and a machine that produces a continuous flow of air through the nasal passage, keeping the airway open (Canadian Lung Association, 2012) (Figure 1). The fact that CPAP therapy has the potential to lower blood pressure suggests that OSA may in fact be causing, or at least contributing to, hypertension in some cases. Due to the strong correlation between OSA and hypertension, and the fact that there is evidence of OSA contributing to hypertension, the Thompson Rivers University (TRU) Sleep Clinic has made efforts to screen all of those patients who are referred to the clinic for overnight ambulatory blood pressure (ABP) monitoring for OSA as well.

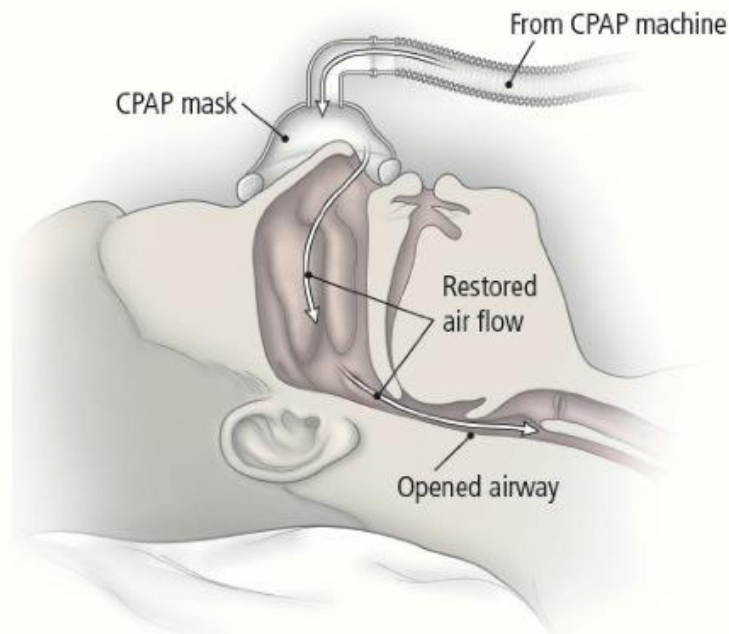


Figure 1. CPAP therapy involves a machine that pumps air continuously through a hose connected to a mask that is worn over the nose (Harvard Health Publications, 2013).

Ambulatory blood pressure (ABP) monitoring is a method of measuring a patient's blood pressure (BP) at set intervals overnight, as opposed to a one time measurement done in a physician's office. Several physicians in Kamloops refer patients that display hypertension during the office-based test to the TRU Sleep Clinic for overnight monitoring. This allows the physician to view a patient's BP overnight when a person with normal BP would usually experience a "dip" or temporary decrease in BP. A person with hypertension however, is often a "non-dipper", therefore does not have the normal overnight drop in BP (Verdecchia, 1991). Non-dipping hypertension has also been directly connected to OSA and so the clinic could use this information as an indicator of possible OSA (Stergiou et al., 2013). ABP monitoring also tends to alleviate

false measurements as a result of “white coat hypertension”, the case where a patient has higher than usual BP readings in the doctor’s office (Anwar and White, 2001, Mancini *et al.*, 2011). ABP monitoring has been shown to be far more accurate for diagnosis compared to home or office-based blood pressure measurements (Hodgkinson *et al.*, 2011).

At TRU, each patient who visits the clinic for ABP monitoring is asked to complete two standardized OSA screening questionnaires, the Epworth Sleepiness Scale (ESS) and the STOP-BANG questionnaire (see Appendix I & II), and is asked general questions about their sleeping habits. The ESS questionnaire was developed in 1991 by Dr. Murray Johns in order to measure daytime sleepiness, which is one of the clearest symptoms of OSA (Johns, 1991). The STOP-BANG questionnaire, or loud Snoring, Tiredness, Observed apnea, high blood Pressure (STOP)-Body-mass index, Age, Neck circumference, and Gender (BANG) questionnaire, is used to determine the likelihood of OSA based on other symptoms and risk factors of OSA including loud snoring, tiredness, high body-mass index etc. (Chung *et al.*, 2013). By employing these methods, clinic personnel hope to get those patients who show a risk of OSA to return to the clinic after their ABP monitoring is complete to receive formal screening and possibly treatment for OSA.

However, as my review of the archived ABP patient file revealed, there has been a lack of follow-through at the TRU Sleep Clinic with ABP patients who also showed signs of

OSA. Many of the ABP patients had ESS and STOP-BANG scores that would indicate that they might be suffering with OSA. Many times, no mention of this was made on the “Request to Archive Patient File” form. Sometimes, the student who conducted the appointment did note that the patient would be a good candidate for OSA, yet still requested to archive the file. As such, the patient would be advised to request a new referral to the clinic for OSA and their file archived. However, a new referral is not necessary to give a pulse oximetry test meaning that this should have been offered to the patient immediately. Pulse oximetry measures oxygen saturation in the blood and therefore reveals whether a patient is breathing effectively at night; this is how the TRU Sleep Clinic screens for OSA.

The ABP patient archival process, with the requirement of a supervisor signature, was designed to ensure that students conducting patient appointments were archiving patient files when appropriate. This would ensure that each patient’s ABP results were sent to the doctor, that the patient did not have outstanding equipment loans, and that the student could make additional comments. The additional comments section was where I often found the information that the patient showed signs of OSA. However, despite this system, ABP patient files were still being archived prematurely, before the patient had been offered testing and treatment for OSA. What the document lacked was a section where the student recorded specific data regarding the patient’s risk for OSA; this would incorrectly demonstrate to the supervisor reviewing the request form that

the patient had received all the care that the clinic could provide and that the file should thus be archived. My goal was to determine how many archived ABP patients should have returned to the clinic for proper OSA testing, how to get those patients to return to the clinic for pulse oximetry, and how to ensure patients' files are not prematurely archived in the future.

MATERIALS AND METHODS

In order to determine how many ABP patient files were prematurely archived, I reviewed all 182 archived files thoroughly over the course of a month. Each file took approximately 30 minutes to review, depending on the patient and the content of the file. I noted their ESS and STOP-BANG scores and their self-reported sleep issues. If their ESS score was above 10, their STOP-BANG score was above 2, and/or they reported loud snoring or daytime sleepiness, I included them in my contact list.

Through my file review, I learned the issues with the process of archiving currently being used in the clinic and I developed a new "Request to Archive ABP Patient File" form to address those issues. I collaborated with the director of the Respiratory Therapy (RT) program at TRU and the RT students working in the clinic to determine what was needed on the new form. I added a section to the form in which RT students who conduct appointments must report patients' ESS and STOP-BANG scores, whether they

report any of the common symptoms of OSA, and whether patients are offered overnight pulse oximetry (See Appendix III).

Once I determined which patients were to be contacted, I developed a script for contacting patients (approved by the TRU Human Ethics Review Board – File Number 100374; See Appendix IV) that focused on the recognized connection between hypertension and OSA, and the possible benefits to their health if they were to be treated for OSA. After contacting the patients and setting up appointments, I showed each patient how to use the pulse oximetry monitor overnight and instructed them to bring it back the following day. Pulse oximetry uses light waves to measure the relative concentrations of hemoglobin (HB) and oxyhemoglobin (O₂Hb) in the blood by measuring the absorbance of the light waves, thus revealing the saturation of oxygen in the blood (Sinex, 1999).

I then downloaded the data and calculated their KDI (Kamloops Desaturation Index) score to determine their level of risk. The desaturation index (DI) is the measurement usually used for pulse oximetry data analysis. DI calculates the number of times per hour that the oxygen saturation in the blood dropped by 4%. KDI is a calculation developed by the TRU sleep clinic as a more sensitive measure of whether a person is at risk for OSA. Instead of a drop by 4%, the KDI calculates the percentage of relevant time that the patient had a saturation value below 90% because that would indicate substantial disturbances in the patient's breathing. $KDI = DI [1 + (\% < 90/10)]$ where $DI =$

desaturation index; % <90 (as a decimal value) = the percentage of those desaturations that were below 90%. Any patient with a KDI value above 6 likely has at least mild OSA and, as that value increases, so does the probability of the presence of higher severity OSA. If the KDI value is below 6, this method is not sensitive enough to determine whether the patient is experiencing apneas and in this case, further testing is recommended.

RESULTS AND DISCUSSION

The review of the archived ABP patient files revealed that 26% (48/182) of the patients showed symptoms of OSA based on the previously mentioned criteria (Figure 2A). This is in agreement with the high correlation between hypertension and OSA that has been demonstrated in previous research (Cohen and Townsend, 2013; Friedman and Logan, 2009; Kapur and Weaver, 2012; Logan et al., 2001; Marin et al., 2012). After learning the number of patients in the clinic that should have been formally tested for OSA and possibly treated, it was important to attempt to get those patients to return to the clinic to assess their sleep issues. I was concerned that contacting patients, who had already been diagnosed with high blood pressure to inform them that they also possibly have OSA and that they should return to the clinic for more testing, would be unsuccessful. The script I developed for contacting patients was designed to focus on the research showing that hypertension and OSA are highly correlated and that treating for OSA, when it is present, can effectively lower blood pressure.

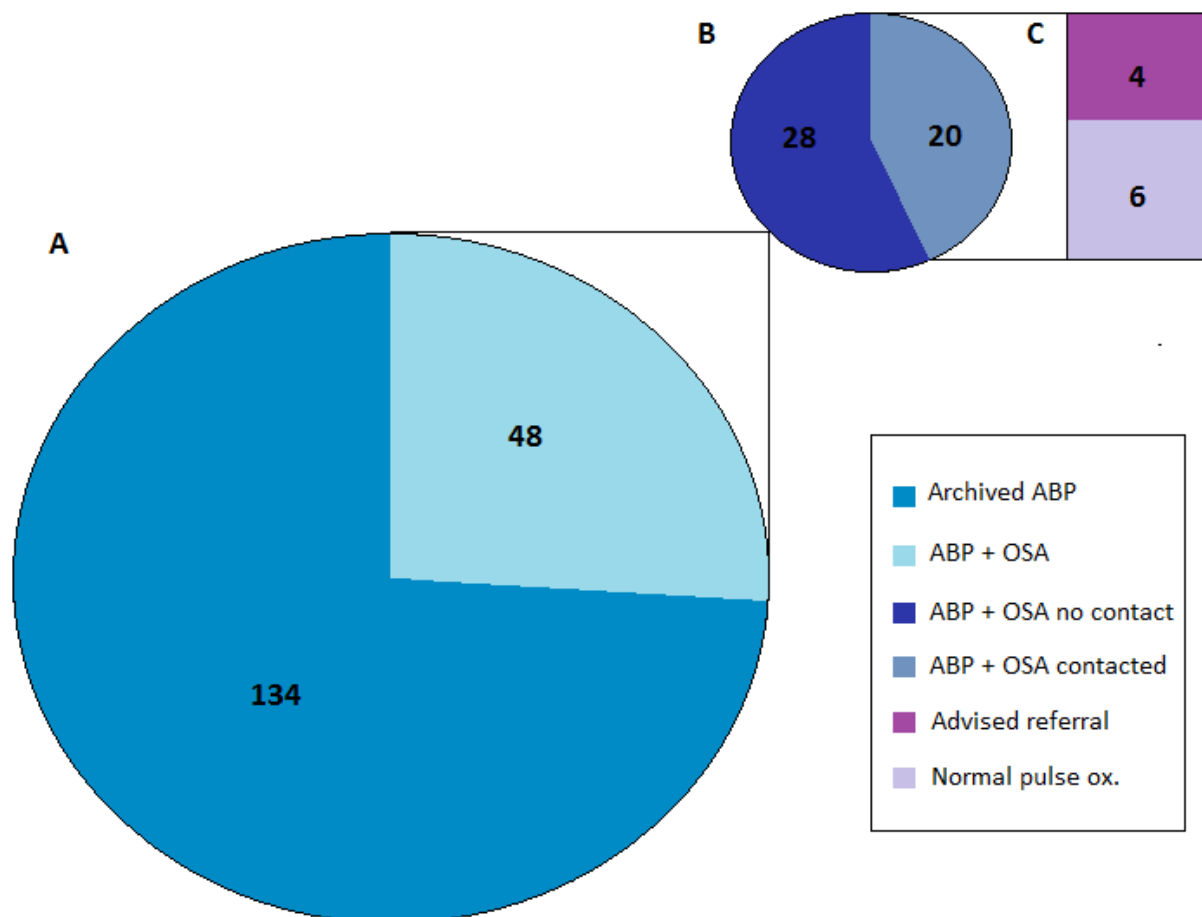


Figure 2. Results of archived ABP patient file review and patient contact. 48/182 archived patients showed symptoms of OSA and should have been offered further testing (pulse oximetry) for OSA. 20/48 patients were successfully contacted and 10 agreed to return to the clinic for pulse oximetry. 4/10 patients had KDI scores over 6 and were advised to ask for a formal referral from their doctor for a CPAP trial.

Some of the patients I attempted to contact had originally come in as early as 2008, so contacting them was particularly difficult because many had changed their contact information, moved, or were deceased. Of the 48 patients identified, I successfully contacted only 20, and out of these, 10 agreed to come back to the TRU Sleep Clinic for overnight pulse oximetry to screen for OSA (Figure 2B). Of the 10 people who underwent a pulse oximetry test, 4 had KDI values above the threshold (Figure 2C) and

were advised to seek a formal referral to the clinic for a CPAP trial. Confidentiality issues prevented me from following up with these patients regarding their actions. The other 6 patients were notified that their pulse oximetry results indicated that they probably did not have OSA; if they were still concerned with their sleep, I advised them to consider taking a polysomnogram at the hospital, a much more comprehensive overnight test, to identify other sleep issues. Overall, the 50% return rate was much higher than expected. I concluded that if patients understand the connection between hypertension and OSA, and the potential benefits to their health from treating OSA, they are usually willing to undergo more testing. Furthermore, if these facts were presented to the patient early, for example during their initial patient visit after they are referred to the clinic for ABP monitoring, and the testing was offered to them at that time, I predict that patients would be even more receptive to the additional test.

The aspect of this project that I hope will make the largest improvement on the lack of follow-through identified herein is the new "Request to Archive ABP Patient File" form. The new form includes a section for students to report patients' ESS and STOP-BANG scores as well as any sleep issues reported during the initial patient contact appointment. By including this information, the supervisor, who must sign the form before the file may be archived, will be able to determine whether the patient shows signs of OSA and, if so, if the patient was offered a pulse oximetry test. While reviewing files, I often noticed that RT students put notes in the file that the patient would be a

good candidate for OSA, yet files were still archived and students recorded that they would await a referral from the doctor. However, once a file is archived, it is not revisited by clinic personnel so if a referral from a doctor never arrived, this patient would not be offered testing. The new form will eliminate the possibility of ABP patients with signs of OSA being overlooked and the files being prematurely archived.

CONCLUSION/FUTURE WORK

The literature review for this project clearly revealed that hypertension and OSA are strongly correlated, as expected, and that hypertensive patients should always be screened for OSA. Since recent research has shown that treating OSA with CPAP can effectively lower blood pressure in hypertensive patients, it would appear these two conditions should also be treated together. This project was successful in identifying a major gap in the process of archiving files in the TRU Sleep Clinic, where ABP patients who also qualified for OSA were not being consistently offered formal screening for OSA. By illuminating this problem and developing the new “Request to Archive ABP Patient File” form, there will be an opportunity for this clinic to build its own database of patients who are being treated for both hypertension and OSA which will open up possibilities for future studies in the clinic. By continuing to study the connection between these two health problems, the TRU Sleep Clinic can be an example of positive change and raise awareness about the efficacy of testing for and treating hypertension and OSA simultaneously.

LITERATURE CITED:

- Anwar, Y. A., and White, W. B. (2001). "Ambulatory monitoring of blood pressure". *Blood Pressure Monitoring in Cardiovascular Medicine and Therapeutics*. Humana Press. 57-75.
- Chung, F., Yang, Y., and Liao, P. (2013). Predictive Performance of the STOP-Bang Score for Identifying Obstructive Sleep Apnea in Obese Patients. *Obes. Surg.* 23, 2050–2057.
- Cohen, D.L., and Townsend, R.R. (2013). Obstructive Sleep Apnea and Hypertension. *J. Clin. Hypertens.* 15, 703.
- Friedman, O., and Logan, A.G. (2009). The Price of Obstructive Sleep Apnea–Hypopnea: Hypertension and Other Ill Effects. *Am. J. Hypertens.* 22, 474–483.
- Haentjens, P., Van Meerhaeghe, A., Moscariello, A., De Weerd, S., Poppe, K., Dupont, A., and Velkeniers, B. (2007). The impact of continuous positive airway pressure on blood pressure in patients with obstructive sleep apnea syndrome: evidence from a meta-analysis of placebo-controlled randomized trials. *Arch. Intern. Med.* 167, 757–764.
- Hodgkinson, J., Mant, J., Martin, U., Guo, B., Hobbs, F.D.R., Deeks, J.J., Heneghan, C., Roberts, N., and McManus, R.J. (2011). Relative effectiveness of clinic and home blood pressure monitoring compared with ambulatory blood pressure monitoring in diagnosis of hypertension: systematic review. *BMJ* 342, d3621–d3621.
- Johns, M.W. (1991). A New Method for Measuring Daytime Sleepiness: The Epworth Sleepiness Scale. *Sleep* 14, 540–545.
- Kapur, V.K., and Weaver, E.M. (2012). Filling in the Pieces of the Sleep Apnea–Hypertension Puzzle. *JAMA* 307, 2197–2198.
- Logan, A.G., Perlikowski, S.M., Mente, A., Tisler, A., Tkacova, R., Niroumand, M., Leung, R.S., and Bradley, T.D. (2001). High prevalence of unrecognized sleep apnoea in drug-resistant hypertension. *J. Hypertens.* 19, 2271–2277.
- Mancia, G., Bombelli, M., Seravalle, G., & Grassi, G. (2011). Diagnosis and management of patients with white-coat and masked hypertension. *Nature Reviews Cardiology.* 8, 686-693.

Marin, J.M., Agusti, A., Villar, I., Forner, M., Nieto, D., Carrizo, S.J., Barbe, F., Vicente, E., Ying, W., Nieto, F.J., et al. (2012). Association Between Treated and Untreated Obstructive Sleep Apnea and Risk of Hypertension. *J. Am. Med. Assoc.* 307, 2169–2176.

Schellenberg, J.B., Maislin, G., and Schwab, R.J. (2000). Physical findings and the risk for obstructive sleep apnea: The importance of oropharyngeal structures. *Am. J. Respir. Crit. Care Med.* 162, 740–748.

Sinex, J. E. (1999). Pulse oximetry: principles and limitations. *Am. J. Emerg. Med.* 17, 59-66.

Stergiou, G.S., Triantafyllidou, E., Cholidou, K., Kollias, A., Destounis, A., Nasothimiou, E.G., Markozannes, E., and Alchanatis, M. (2013). Asleep home blood pressure monitoring in obstructive sleep apnea. *Blood Press. Monit.* 18, 21–26.

Unknown Author (2008). Academy of Sleep Medicine: *Obstructive Sleep Apnea*. <http://www.aasmnet.org/resources/factsheets/sleepapnea.pdf> (accessed February 21, 2014).

Unknown Author (2012). Canadian Lung Association: *C.P.A.P.*. http://www.lung.ca/diseases-maladies/apnea-apnee/cpap-cpap/index_e.php (accessed April 26, 2014).

Unknown Author (2009). Public Health Agency of Canada. What is the Impact of Sleep on Canadians: *Fast Facts from the 2009 Canadian Community Health Survey - Sleep Apnea Rapid Response*. <http://www.phac-aspc.gc.ca/cd-mc/sleepapnea-apneesommeil/ff-rr-2009-eng.php> (accessed February 21, 2014).

Verdecchia, P., Schillaci, G., and Porcellati, C. (1991). Dippers versus non-dippers. *J. Hypertens. Supplement: official journal of the International Society of Hypertension* 9, S42-4.

Watson, S (2013). Harvard Health Publications: *Weight loss, breathing devices still best for treating obstructive sleep apnea*. <http://www.health.harvard.edu/blog/weight-loss-breathing-devices-still-best-for-treating-obstructive-sleep-apnea-201310026713> (accessed April 26, 2014).

APPENDIX I

THOMPSON RIVERS UNIVERSITY CENTER FOR RESPIRATORY HEALTH AND SLEEP SCIENCE

Room S301 900 McGill Rd, Kamloops, BC V2C 0C8
Phone: 250-371-5952 Fax: 250-371-5771 Email: studentsleepclinic@tru.ca



FORM #7: ESS QUESTIONNAIRE

(5 min)

PATIENT		Age	
DOB (mm/dd/yy)		Male / Female	
Student Name		Date	

Epworth Sleepiness Scale (ESS)

How likely are you to doze off or fall asleep in the following situations (as opposed to just feeling tired)? This refers to your normal/typical way of life in recent times. Even if some of these situations have not occurred recently, imagine how they may affect you.

Circle the appropriate number for each situation;

Situation	Never	Slight chance	Moderate chance	High chance
Sitting and reading	0	1	2	3
Watching TV	0	1	2	3
Sitting, inactive, in a public place (eg; theatre, meeting)	0	1	2	3
A passenger in a car for an hour, without a break	0	1	2	3
Laying down in the afternoon	0	1	2	3
Sitting and talking to someone	0	1	2	3
Sitting quietly after lunch (without alcohol)	0	1	2	3
Driving a car, stopped for a few minutes in traffic	0	1	2	3

Total Score: _____ / 24

APPENDIX II

FORM #4: STOP-Bang Questionnaire			Date (mm/dd/yy)		
PATIENT				Male / Female	
DOB (mm/dd/yy)		Age		Neck circumference	
Height		Weight		BMI	

- | | |
|---|--|
| <p>1. Snoring: Do you snore loudly (loud enough to be heard through closed doors)?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> <p>2. Tired: Do you often feel tired, fatigued or sleepy during the daytime?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> <p>3. Observed: Has anyone observed you stop breathing during your sleep?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> <p>4. Blood pressure: Do you have or are you being treated for high blood pressure?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> | <p>5. BMI: BMI more than 35 kg m⁻²?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> <p>6. Age: Age over 50 years old?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> <p>7. Neck circumference: Neck Circumference >40 cm?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> <p>8. Gender: Male?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> |
|---|--|

A score of 3 or more is considered high risk for OSA a score of 8 is considered definitive.

APPENDIX III

THOMPSON RIVERS UNIVERSITY
CENTER FOR RESPIRATORY HEALTH AND SLEEP SCIENCE

Room S301 900 McGill Rd, Kamloops, BC V2C 0C8

Phone: 250-371-5952

Fax: 250-371-5771

Email: studentsleepclinic@tru.ca



THOMPSON RIVERS
UNIVERSITY

FORM #13: REQUEST TO ARCHIVE ABP PATIENT FILE

DATE:

PATIENT			Male / Female
DOB (mm/dd/yy)			Age
Phone	H	W	C
Preferred Contact #	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Email			
Address		City	
Province		Postal Code	
Referring Physician		Family Physician	
Initial Contact Date:		Last Contact Date:	

Results of ABP: ☐ Normal ☐ High Normal ☐ Hypertension: circle one
(mild, moderate, severe)

Check reason for request to archive patient file:

- ☐ Patient does not wish to be contacted again by the clinic
- ☐ Phone number is no longer in service
- ☐ New phone number **cannot** be determined after call to family physician
- ☐ Patient is complete and has not made contact / returned calls within the last year.
- ☐ Patient is deceased Date: _____
- ☐ Patient was referred, but has not responded to initial contact in 6 months.

(Patient now requires new referral)

Check off as ascertained from patient file and documentation:

☐ Patient does **NOT** have TRU equipment

Date of Equipment Return: _____

☐ Patient **DOES** have the following equipment;

☐ CPAP

☐ Humidifier

☐ Mask

☐ Pulse Oximeter

Sleep Information:

ESS Score: _____

Stop-Bang Score: _____

Was the patient encouraged to undergo overnight pulse-oximetry? ☐ Yes ☐ No

Did the patient report:

Snoring ☐ Yes ☐ No

Bruxism ☐ Yes ☐ No

Episodes of apnea ☐ Yes ☐ No

Restless sleep ☐ Yes ☐ No

Daytime fatigue ☐ Yes ☐ No

Comments: _____

Print Student Name

Signature, SRT

Faculty Name

Faculty Signature

☐ Request Accepted Date of Archive: _____

APPENDIX IV

4/14/2014

Gmail - REB Approval (COA)



Kayla Holtslag <kaylaholtslag@gmail.com>

REB Approval (COA)

dkrebs@tru.ca <dkrebs@tru.ca>

Wed, May 29, 2013 at 10:21 AM

To: "Ms. Kayla Holtslag (Primary Investigator)" <kaylaholtslag@gmail.com>

Cc: "Nancy Flood (Faculty Supervisor)" <nflood@tru.ca>, "Prof. Les Matthews (Faculty Supervisor)" <Lmatthews@tru.ca>, dkrebs@tru.ca



THOMPSON RIVERS
UNIVERSITY

May 29, 2013

Ms. Kayla Holtslag
Faculty of Science\Biology
Thompson Rivers University

File Number: 100374
Approval Date: May 29, 2013
Expiry Date: May 28, 2014

Dear Ms. Kayla Holtslag,

The Research Ethics Board has reviewed your application titled 'Ambulatory Blood Pressure Monitoring in the TRU Sleep Clinic: Should High Blood Pressure and Sleep Apnea be Tested for and Treated Simultaneously'. Your application has been approved. You may begin the proposed research. This REB approval, dated May 29, 2013, is valid for one year less a day: May 28, 2014.

Throughout the duration of this REB approval, all requests for modifications, renewals and serious adverse event reports are submitted via the Research Portal. To continue your proposed research beyond May 28, 2014, you must submit a Renewal Form before May 28, 2014. If your research ends before May 28, 2014, please submit a Final Report Form to close out REB approval monitoring efforts.

If you have any questions about the REB review & approval process, please contact the Research Ethics Office via [250.852.7122](tel:250.852.7122). If you encounter any issues when working in the Research Portal, please contact the Research Office at [250.371.5586](tel:250.371.5586).

Sincerely,

Chair, Research Ethics Board